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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

REDDING, THOMAS M

ART UNIT	PAPER NUMBER
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2624

MAIL DATE	DELIVERY MODE
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10/25/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/534,828

Applicant(s)

QUIST ET AL.

Examiner

Thomas M. Redding

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET, TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Specification

1. The specification in its current form is without section headings for the Summary of the Invention, Brief Description of the Drawings and the Detailed Description of the Invention. The examiner suggests that the applicant update the specification to conform to customary US practice.

Claim Objections

2. Claim 7 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 7 states a "use" of claim 1 ("[m]ethod as claimed in claim 1, wherein said method is used for increasing the flexibility of deformable grids having a number of control points used for elastic registration of images."). This use of the method of claim 1 does not add any further step or structure to the elements of claim 1 and is merely descriptive.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, the claim as written describes 3 process steps in the alternative: "d1) which do not belong to any cluster by an interpolation of the transformation parameters of neighbouring control points,

d2) which belong to one cluster by an interpolation of the transformation parameters of neighbouring control points of said one cluster, or

d3) which belong to more than one cluster by determining intermediate transformation parameters for each cluster based on an interpolation of the transformation parameters of neighbouring points of each of said clusters separately and by determining the transformation parameters from said intermediate transformation parameters". This is interpreted as d1 or d2 or d3. Only one of the 3 elements is required to satisfy the claim.

The specification describes d1, d2 and d3 as steps in an algorithm that all occur in order to handle newly added control points that are in 0, 1 or multiple clusters of existing control points. A variation of the algorithm only using a subset of these steps is not described.

Claim 1 as written is not consistent with the specification, thus rendering it indefinite (MPEP §2173.03). Correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claims 10 and 11 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 10 defines a computer program embodying functional descriptive material. Claim 11 defines a data carrier for a computer program embodying functional descriptive material. However, the claims do not define a computer-readable medium or computer-readable memory and

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are thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV).

The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claims to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory (refer to "note" below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

A "signal" (or equivalent) embodying functional descriptive material is neither a process nor a product (i.e., a tangible "thing") and therefore does not fall within one of the four statutory classes of § 101. Rather, "signal" is a form of energy, in the absence of any physical structure or tangible material.

Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a "signal", the claim as a whole would be non-statutory. In the case where the specification defines the computer readable medium or memory as statutory tangible products such as a hard drive, ROM, RAM, etc, as well as a non-statutory entity such as a "signal", "carrier wave", or "transmission

medium", the examiner suggests amending the claim to include the disclosed tangible computer readable media, while at the same time excluding the intangible media such as signals, carrier waves, etc.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 to 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Covell et al. (US 2001/0028731 A1) in combination with Milliron (US 6,608,631 B1).

Regarding claim 1, Covell discloses a [m]ethod of computing the transformation for transforming two images, in particular medical MR- or CT-images of a patient, one into the other ("The present invention is directed to data analysis, such as audio analysis, image analysis and video analysis, and more particularly to the estimation of hidden data from observed data. For image analysis, this hidden data estimation involves the placement of control points on unmarked images or sequences of images to identify corresponding fiduciary points on objects in the images", Covell, paragraph 2) comprising the steps of:

a) initialising a set of control points in both images ("The control points are labeled in the representative images by the user", Covell, paragraph 36),

b) determining the transformation parameters for said control points ("a matrix of control point location variations can be created as follows:

$$P=[(p_1-P)(p_2-P) \dots (p_M-P)]. \quad (2)''.$$
 Covell, paragraph 42),

c) performing a clustering of corresponding control points such that all control points of a cluster have substantially the same transformation parameters so as to obtain one or more clusters of control points ("This can be translated into features by "K-means clustering" with a distance metric that includes both the average proximity of the differentiated points and the variance in proximity of the points across the training database", Covell, paragraph 87).

d) determining the transformation parameters for further control points ("To generate a model which is used to automatically label control points on other, unmarked images of a human mouth, the representative pre-aligned subimages and their control-point locations are analyzed to generate a joint model of their expected values and of their expected coupled variations", Covell, paragraph 38),

d1) which do not belong to any cluster by the transformation parameters of neighbouring control points ("for each control point which does not lie within any feature's extent almost always (e.g. more than 90% of the time) a distance metric is determined between the control point and the centers of all of the features, which takes into account both the average proximity and variance in proximity. The feature with the smallest distance metric is chosen for the control point", Covell, paragraph 92),

Although not required by the language of claim 1, Covell further discloses:

d2) which belong to one cluster by the transformation parameters of control points of said one cluster ("for a control point which almost always lies within one feature's extent, (e.g. greater than 90% of the examples), and seldom lies within any other feature's extent, (e.g. less than 50% of the examples), the control point is associated with the one feature", Covell, paragraph 90), or

d3) which belong to more than one cluster by determining intermediate transformation parameters for each cluster based on the transformation parameters of points of each of said clusters separately and by determining the transformation parameters from said intermediate transformation parameters ("for each control point which lies within the extent of plural features more often than is considered seldom (e.g. more than 50% of the time) the same distance metric is used between the control point and the centers of the features with which it overlaps the required number of times. The feature which exhibits the smallest distance metric is chosen for the control point", Covell, paragraph 93).

Covell does not disclose an interpolation of the parameters of neighbouring control points.

Milliron, working in a similar problem solving area of image warping, does teach interpolation of the parameters of neighbouring control points ("An interpolating warp maps model points located on source features to corresponding locations on target features", Milliron, column 28, line 40).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to combine the interpolation method of Milliron with the control point generation system of Covell in order to estimate a more exact position of a new point.

Claims 2, 3, 4, and 5 further limit elements d2 and d3 originally introduced by independent claim 1. Elements d1, d2 and d3 of claim 1 are recited in the alternative (i.e., "or" language). Given that the prior art anticipates element d1 (i.e., refer to the claim 1 rejection), the prior art need not anticipate elements d2 and d3 or any further limitations added thereto by dependent claims.

Regarding claim 6, the combination of Covell and Milliron discloses wherein said method is used during template propagation ("To generate a model which is used to automatically label control points on other, unmarked images of a human mouth, the representative pre-aligned subimages and their control-point locations are analyzed to generate a joint model of their expected values and of their expected coupled variations", Covell, paragraph 38, Covell generates a model or a template, which is then repeatedly applied to new images. The template propagates through an image set).

Regarding claim 7, the combination of Covell and Milliron discloses wherein said method is used for increasing the flexibility of deformable grids having a number of

control points used for elastic registration of images (Covell, paragraphs 131 and 132 point out many areas of application for deformable grid based systems that illustrate the great flexibility of the method. Some of the applications that he specifically describes include: image segmentation and recomposition, automatic morphing, feature registration, robot guidance, face recognition, gesture recognition, body tracking, image encoding and recognition of periodic or near periodic motion.

It will be appreciated by those of ordinary skill in the art that the present invention can be embodied in other specific forms without departing from the spirit or essential characteristics thereof. For example, the principles of the invention are not limited to use on natural images, they can also be employed in connection with graphic images, including images which contain large areas of the same color, such as cartoons. Furthermore, the invention is not limited to use with two-dimensional images. It is equally applicable to one-dimensional data signals, such as the location of vocal tract positions in a speech signal, to perform linear predictive coding. Similarly, it can be applied to video signals, which can be viewed as three-dimensional data since they include the added dimension of time", Covell, paragraphs 131 and 132, the system is flexible enough to find use in many application areas).

Regarding claim 8, the combination of Covell and Milliron discloses a [m]ethod as claimed in claim 1, further comprising the step of interactively assigning control points to

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clusters by a user ("manually defined features and, by extension, manually defined groupings of features and control points", Covell, paragraph 84).

Regarding claim 9, the combination of Covell and Milliron discloses all the elements in common with claim 1 above and further disclose a device for implementing the method ("In practice, the present invention is carried out on a computer that is suitably programmed to perform the tasks described hereinafter", Covell, paragraph 32).

Regarding claim 10 as currently understood, the combination of Covell and Milliron discloses a [c]omputer program comprising computer program means for causing a computer to perform the steps of the method as claimed in claim 1 when said computer program is executed on a computer ("In practice, the present invention is carried out on a computer that is suitably programmed to perform the tasks described hereinafter", Covell, paragraph 32).


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas M. Redding whose telephone number is (571) 270-1579. The examiner can normally be reached on Mon - Fri 7:30 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TMR/



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PRIMARY EXAMINER